THE

BARTON AQUEDUCT.

READ BEFORE THE MEMBERS OF THE STRETFORD MUTUAL IMPROVEMENT SOCIETY, NOVEMBER, 1859.

BY

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The remark that travellers should visit and inspect the curiosities of their own country, before they seek for wonders and objects of interest in distant lands, has become almost a national maxim. Every local district possesses peculiar characteristics, and the wise and observant, who scan the works of nature and of art, will always derive from their investigations, whether at home or abroad, rewards in knowledge which will more than compensate for the time and trouble bestowed upon their acquisition. The students in scientific and literary institutions will unquestionably obtain gratifying confirmation of every true theory which they may have embraced, by availing themselves of the practical test now afforded in the general application of true principles in the manipulations of industry, and in the construction of works of public utility. An agriculturalist, by his knowledge of the power of the vegetating principle, of the nature of the soil subjected to his labours, and of the agencies which are best adapted to secure successful cultivation, is enabled to test and prove the truth of his section of science; and, by the practical application of his skill, is rewarded by an abundant increase in the fruits of the earth. In modern manufacturing art the principles of science are daily tested; and in the application of chemistry, mechanism, and of engineering and manual skill, in the production of

the comforts of life, the aphorism is again confirmed—that knowledge is power. Disease and death have been diminished by the discoveries in medical science, and by the more judicious administration of remedies; and the skilful physician, aided by his mental acquirements, not only promotes the prolongation of life, but he adds to the productive power of human existence in affording increased mental and bodily health. Probably, however, engineering skill has been more beneficially applied than any other human effort, in enlarging the field whence industry obtains the varied powers which lead to comfort, progress, and profit; whence communication diffuses information and intelligence; whence man receives his locomotion, and offers his sympathy and knowledge to his civilised or untutored fellows in every region; and whence, by the developed and triumphant power of steam, wind, and water, nature's obstacles are subdued, to the universal advantage of mankind; and, therefore, these practical tests and results vindicate the boundless worth of well-directed science.

With these preliminary observations, we proceed to consider the claims of a local work of art to our respect and veneration. In our own immediate neighbourhood there was projected, exactly a century ago, and subsequently erected and completed with extraordinary skill and dispatch, the Barton Aqueduct; but we approach the contemplation of that work, mingling our feelings of wonder with profound admiration for the difficulties which were surmounted, and for the useful triumph which was achieved. The practical application of science in aid of public works had not commenced; education was defective and limited; Watt had not given his drudge of labour, the steam-engine, to be the slave of progress; mechanics' institutions did not exist, and then the minds of our youth were left unstored by that knowledge to which we have referred, as having most essentially contributed to the advancement and distinction of our age. About the time of this interesting

period in the history of the industry of this district, the late and celebrated Duke of Bridgewater having had the penetration and sagacity to foresee the capabilities of Manchester and its neighbourhood for extending the infant manufacture of cotton, and possessing in his estate at Worsley mines of coal for which he wanted an ample market, as well as the means of conveyance, he conceived the bold project of forming a canal which should penetrate his mines, and convey their yield of fuel to consumers waiting new supplies, and to furnaces not then constructed, but which, by reasonable anticipation, he believed would be called into extensive existence. To enable him to accomplish his object, he sought the services of James Brindley, a humble millwright, who was born in Derbyshire, but who resided in the neighbourhood of Macclesfield, in Cheshire, where he had obtained the reputation of being a man of mechanical skill, and of considerable experience in works of engineering difficulty ; but the Duke also obtained the assistance of an excellent coadjutor in John Gilbert, another clever man, and he thus secured in work and counsel the support of two men whose chief recommendation was, most probably, their possession of the inestimable gift of common sense. Of the private history of Gilbert little is known, and as the Duke and Brindley were the most prominent in the great work, the incidents of its career will be almost exclusively confined to these two last named and distinguished individuals ; and, therefore, a glance at the personal history of each of them will be neither unacceptable nor uninstructive.

Francis, the sixth Earl, and the third and last Duke of Bridgewater, was born in 1736. He lost his father at an early age, and the Duke of Bedford and Lord Trentham became his guardians, who sent him, when seventeen years old, to make the tour of Europe. Though he entered into the gaieties, if not into the dissipations of the age, he probably had observed with care the public works of the con-

tinent, and particularly those of Italy. His youthful taste led him to Newmarket and the turf, and in Trentham Park he rode a race with a prince of royal blood, the Duke of Cumberland. He thus acquired the fame of being "a fast man." But the event in the early life of the Duke of Bridgewater, which determined the destiny of his career more than any other, was an affair of perhaps not unrequited love, but having formed an attachment to a lady of great personal charms, without the engagement being ratified, he lost his spirit of gallantry, and thereafter resisted the attractions of the fair. He retired to Worsley, lived unostentatiously upon £400 a year, and devoted himself to the requisite arrangements and preparation for the great work of his life. Sometimes he visited London, but had no residence there, though he was the inmate of a family where he could invite his friends to partake of his hospitality. His habits were simple, his costume plain, and the indications of his true greatness were so few in his exterior appearance that, it is said, when on the occasion of his dining at a west-end hotel, he ordered a small cucumber for himself, the price of which was very high, the waiter, before serving him, asked his master if he might trust the gentleman in the brown coat with so costly a luxury; and he received the reply that he might serve him with all the house contained. According to the standard of modern educational attainments, the Duke would be deemed deficient in learning and in mental cultivation. His friends evidently regarded him as an enthusiast, and believed that he had associated himself with dreamy theorists and speculative adventurers.

James Brindley was born of respectable parents, in 1716, but his father becoming unfortunate his education was neglected, and he could scarcely read or write. He was apprenticed to a millwright, and soon became an apt and practical mechanic. He entered upon his business with assiduity; fame proclaimed him to be an ingenious and

clever man. The opportunity was afforded him of constructing a very extraordinary water engine, at Clifton, for the draining of coal mines; and the Duke, hearing of his engineering celebrity, applied to him for his services, which were, it is recorded, offered at the rate of one guinea per week. A biographer of Brindley says of him—"Alone he stood, alone he struggled, and alone he was proof against all the assaults of men who branded him as a madman, an enthusiast, and a person not to be trusted." Here, then, were none of the beauties, none of the blandishments, and none of the helps of science. No working plans or models, no drawings, and no scientific surveys were there, and prudence and skill being alike supposed to be absent from the contemplated innovation upon precedent and the wisdom of bygone days, the friends of the Duke prevailed upon him to allow a distinguished engineer from London to inspect the site of the Barton Aqueduct, that its practicability might be ascertained; and he came, viewed with wonder the gulf which was proposed to be passed by brick and stone arches, intended to carry a body of water above the river nearly equal to the content of the river itself, and exclaimed that "he had often heard of castles in the air, but never till then had he seen the place where it was gravely proposed to build one."

Confident in his design, and in the skill of his assistants to erect and mature it, the Duke determined to persevere, and to defy the prognostications of disaster and defeat. Thus began, without parade or display, the construction of the earliest engineering work of magnitude in Lancashire. At that time the population of Manchester and its vicinity was below 20,000, and the whole county of Lancashire did not contain 300,000 inhabitants. The waters of the Irwell and Medlock were pure streams, affording succour and support to their finny occupants, the trout; and in the suburbs of the youthful city, at Knot Mill, in view of the confluence of those rivers, the Duke often resided in a

cottage, built of brick, whence he effectually inspected the progress of his great work; and that cottage, now improved, is occupied by a respected agent of his Trust. Changing the scene to Barton, then were seen, in their cheering gurgle, the unpolluted waters of the augmented Irwell. On the north side of the river we are led to the now explored mountain of coal mines at Worsley, and on the south stands the high ground of Trafford Park. But viewing in imagination the chasm in which the river flowed, the width from side to side which the aqueduct was designed to occupy, and having no parallel structure as an example to follow, the strongest mind might doubt, and the stoutest heart fail, on beholding the difficulties to be overcome, and the stupendous work to be erected. The true philosopher, however, sees obstacles not as impediments, but that they may be removed, he contemplates, reasons, and succeeds. His courage is derived from the power of truth, his guides are the laws of nature and of the universe, and he finds—"Books in running brooks, sermons in stones, and good in everything."

In the sanguine visions of the Duke no doubt he saw in prospect his difficulties removed, his aqueduct erected, and his future canals stretching forth their watery arms to bear the burthens of labour and of commerce, and already he fancied in his clutch the golden harvest which he hoped to reap. Rigid economy, however, in the judicious investment of his rental income was insufficient to supply the funds needed for the payment of labour, and of materials used in the progress of his work, and often were his pecuniary difficulties as great as were the natural and other obstacles. With firm resolution he adhered to his determination not to involve his patrimonial estates in his possible failure. He declined to raise funds by mortgage, but he was not unwilling to receive on loan the savings of small tradesmen, and he borrowed from farmers sums of ten pounds and upwards, to enable him to meet with credit his business engagements. Gilbert was financially most useful; he inspired confidence

in his master's schemes; he procured requisite, and, indeed, indispensable supplies of cash; negotiated with landowners for compensation for trespass and passage through their estates; and, faithful in counsel, his services and support were invaluable. But the toil of the brain was with Brindley, and his physical and mental powers were frequently exhausted. To renovate his expended strength he had recourse to the singular expedient of making his bed alike his study and his hospital, and whenever he was perplexed with engineering difficulties, his renewing, refreshing, and reinvigorating solace was his bed. The rules of arithmetic were unknown to him, and of the higher methods of computation he was totally ignorant; but the natural power of his mind enabled him to estimate quantities, and by mental deduction, combined with mechanical knowledge, obtained in the school of practical experience, he could in his mind construct, in their due proportions to secure safety and strength, embankments and bridges, could excavate for the culvert or tunnel, could raise the valley and depress the mountain to suit his object, and could form that bounded and extended level plain by which, without a lock, the Bridgewater Canal stretches from Manchester to Runcorn! Brindley bravely did his duty; his labour finished, success awaited him, but his nerves were unstrung, he dreaded the application of the test which we laud, of practical results being found in harmony with conjecture and theory. The moment had arrived when the canal should receive its supply of water, and when it would be known whether the aqueduct could sustain its liquid load; but the courage of the intrepid Brindley here failed him, and fearing that, like the engineer hoisted by his own petard, he might witness the wreck of his skill and labour, or be drowned in the deluge of water which he desired to imprison for the service of man, he was now overwhelmed with difficulties, in imagination only. He sought refuge in this town of Stretford, and in his absence the Duke and Gilbert saw the waters softly and

safely flow to their new abode of laborious duty. No flinching of the aqueduct, and no accident betokened present or future disappointment in the triumph which was then achieved. Brindley was brought, if not excavated, from his temporary retirement, and the bloodless victory of skill and labour was complete. All honour to the sagacious and courageous Duke, to the valiant-minded Brindley, to the faithful Gilbert, and to the honest workmen whose labour raised this monument to utility, and devoted to the progress of the age another agent of advancement. The Duke received the smiles of fortune, though he had been denied the domestic joys of home and of matrimony. And now may I ask if my friends have been satisfied with and instructed by their pilgrimage this evening to the Barton Aqueduct? Still existing in matured usefulness, that structure is yet seen in the freshness of age. Its neighbourhood has become populous, but the once limpid waters of the Irwell are now sable as night; and, save when the storm lashes their waves into a foam of whiteness, the visitor might think that he had arrived at a resuscitated Styx. With increased population, wealth, and public works of convenience, the corruption of the waters of our rivers has to be deplored. The rivers Irwell and Medlock, like the metropolitan Thames, have almost become mere main sewers, and a treble wrong has thence arisen. Their waters are rendered offensive, and they impregnate the air with poisonous vapours, to the detriment of health; the natural nutriment of the land is absorbed, dissipated, and wasted; and the original purity of our crystal fountains is lost in their conversion into defiling mud. That the waters of the Bridgewater Canal should now diffuse contaminating stenches is perhaps the only regret associated with that splendid work, but with the public, and not with the proprietors of that canal, rests the cause of offence, as also the remedial cure. Whether our once beautiful rivers shall permanently be converted into town drains and sewers, probably posterity will have to decide, rather than ourselves;

but, in the meantime, in sending them as they now are to our successors, we leave behind us filthy legacies. This black page in our local history we would gladly have withheld, but faithfulness to the cause of material progress requires the promulgation of the plainest truth, and we could not spare this unwelcome episode.

Aqueducts and canals are of very ancient origin, and probably were first constructed in the East, where the scorching sun evaporated the moisture of the arid soil, and water was stored in magnificent reservoirs, and served alike the purposes of navigation and irrigation. To the present moment the canals and public works of China remain splendid monuments of knowledge, and of practical science in ages of the world when our forefathers had not emerged from the darkness of ignorance. From time immemorial reservoirs and tanks have existed in the East Indies, though we, as the conquerors of that territory, damaged those adjuncts of civilisation; but it is satisfactory to learn that we are now repairing and extending the ancient water-ways of our now vast dependency. The Greeks and Romans built aqueducts chiefly to convey water for domestic use; and now, in Italy, are splendid works and remains which were erected to insure abundant supplies of water. But the Alexandrian Canal was the wonder of the age at its birth, as it now is of our historical recollections. Europe is now intersected with canals, and bridges and aqueducts abound upon its continent. Singular, as true, England, of any great country, last availed herself of canals and aqueducts; her first, but short canal of five miles only, having been constructed at Sankey, near Warrington, in 1755, four years before the act was obtained for the Bridgewater Canal. Self-interest, under the guise of humanity, resisted the encroachment of water conveyance, and parliamentary power for making the Sankey Canal was given upon the condition that the labour of men only should be employed in propelling the barges to be borne upon its waters; and now, as a century ago, men, like beasts of

burden, may be there daily seen performing mere animal and degrading drudgery. Justice, however, to the magnitude, to the difficulties, to the success and usefulness of the Bridgewater Canal, with its aqueduct, requires that it should be regarded as the first and parent work of its class. The kindred spirit of the Duke extended; and now in every part of the United Kingdom are to be found canals, and works equal in utility and construction to the aboriginal innovator.

Let us now contemplate the general indications which were dawning upon the industry of Lancashire when, inspired by the wants of the age, and prompted by his own enlightened self-interest, the Duke arrived at the conclusion, after reasoning, deliberating, and listening to remonstrances, that it would be both wise and profitable to give practical existence to his projected canal.

Essentially, during the reign of Queen Elizabeth, had the industry of this district begun to assume an important aspect. The inhabitants were, indeed, few in numbers; and, of course, the artisans were still fewer, but these were increased by refugees from foreign persecution, who brought with them valuable arts, which became of important service in founding a manufacturing system destined to rival every other in the world. Linen warps were imported from Germany, and home and hand spun cotton woof formed the transverse threads of an excellent fabric. Linsey-woolseys were staple products, and cotton velvets were comparatively largely made, and much esteemed. Still the extent of the domestic manufactures was restricted and limited, till the commencement of the reign of George the Third, in 1760, but the manufacturing and mercantile fame of Manchester in foreign markets had become known and appreciated. The desire to enlarge and improve manufacturing operations had been created, skilled and experienced workmen were in existence, and the most prominent want of the period was the material

whereon could be employed the dexterity of the artisan. Linen warps could not be supplied from abroad to meet the growing demand, and cotton woofs or wefts could not be spun or procured to satisfy the wants of the moment. Then rumour began to tell of mechanical contrivances which would supply machine-spun yarns. Hargreaves was meditating upon his infant jenny, and after toils and troubles unknown and unrewarded, he gave to the rising trade an excellent machine for spinning several threads of cotton yarn at the same time. Arkwright then entered the field of invention, and matured the spinning throstle for the production of cotton warps. These were invaluable contributions of mechanism in aid of the still infant trade; but, by the employment of manual power to work machinery, it was discovered that labour could not be spared for such a purpose, and a new element of propulsion was needed and called for. Waterfalls were sought and found, mills were erected, and power being still scarce and insufficient, steam was suggested as the future never-failing source of mechanical impulse. Again another want is supplied; and James Watt, as a master spirit, having arisen and converted water into powerful vapour, he controlled, subdued, and placed in perpetual servitude, for the benefit of all mankind, this new element of his peaceful conquest. Hence came the mighty steam-engine, the universal drudge and untortured slave of every man! A word for Watt! His was the richest gift of mind and science. Mentally well taught and trained, imbued with theoretical, abstract and practical principles in mechanics and philosophy, he was prepared to surmount the difficulties he had to encounter, and his success has eclipsed the genius of every competitor for mechanical honours. Yet another contribution to the demands of the age was in preparation, by the talented, ingenious, and practical Samuel Crompton, who subsequently gave to the cotton trade the most valuable spinning machine which it possesses. Crompton's mule has enriched, in all probability, more members of

the human family than has the invention of any other man for a like purpose; but, having added to the wealth of his country to an extraordinary extent, he was permitted to terminate his days in neglect and poverty. All these men of eminence were contemporary with the Duke and Brindley. They were in advance of their age. Their coming inventions were shadows of the benefits which they were conferring upon their country and the human family. Only Arkwright and Watt were enriched by their own labours, and the originality of the reputed invention of the former remains clouded in doubt, but of the merit of the inventions, and of the profound mental attainments of the latter, no question arises to diminish the lustre of his great name. Hargreaves and Crompton were the victims of the rapacity of those whom they immediately benefited; and, whilst the master spinners and manufacturers obtained fortunes from the inventions of those two ingenious and devoted men, they, the originators of a new industry, were permitted to feel penury and neglect, and to enjoy the reward of *fame* without the compensation of *competency*. Looking at the fate of those two benefactors of their race, we would not raise the standard of pecuniary success as the proof of talent; but, on the contrary, would shun the mere mercenary test as unworthy the comparison of mind with money.

More recently, of humble origin and pretensions, George Stephenson has lived his day of useful greatness. He may well be mentioned with all those pioneers of progress to whom we have referred, and having hurled steam's rapid car as his gift to these times of inventive wonders, we are glad to record that rewards and honoured fame have been his portion, though upon him and his worthy son the grave has early closed, and terminated careers of distinguished renown. If the inquiring test of the first Napoleon—What has he done?—be applied to the great men who have thus been conspicuous benefactors of their age, we reply for each, his works live after him. The vulgar tests of Who is he,

what is his wealth, and whence has he come? even if answered to the gratification of the querist, we leave to the fluttering flies of the transient hour, and recognise only, as the basis of deserved distinction, DUTIES PERFORMED AND SERVICES RENDERED.

Our young friends, the students in this institution, have in the examples now placed before them incentives to mental and useful exertion; they reside in the vicinity of a work of extraordinary merit and usefulness, which was erected under extraordinary difficulties, and they possess the means of self-improvement and mental cultivation greatly beyond Brindley, and other sons of genius.

The Barton Aqueduct and Bridgewater Canal have engaged public attention at intervals during the last hundred years, and for further information respecting them, we refer to the "Encyclopædia Britannica," to a brief sketch in the "Gentleman's Magazine," in January, 1766, and to an elaborate paper in the "Quarterly Review," of 1844, by the late Lord Ellesmere.

A brief reference to the relative position and prospect of the industry—of which the city of Manchester is the centre—in connection with the work which has received our attention, may appropriately conclude the local history and observations which have now been submitted to your consideration. Evidently the spread of knowledge had begun to awaken the previously dormant intelligence of our predecessors. Wants had begun to press their claims to be supplied; and experience of the productive labours of the past told of energies to be developed in the future, and of comforts to be derived from improved and extended trade and commerce.

Presuming that the Duke had the penetration to see the signs of his times, he would almost feel that he had to enter upon a mission in harmony with the requirements of his age. Pack-horses were then extensively and literally the carriers of the day, and so numerous were their owners that

these regarded themselves as possessed of vested and protective rights, and consequently resisted impending change and improvement. The roads of Lancashire were at that time miserable, and almost impassable except for single-laden horses, and these were totally insufficient to convey the increasing products of industry. An augmented demand for fuel arose, and enlarged supplies became indispensable. Business transactions with Liverpool increased, and more frequent and expeditious communication with that port was necessary. Slumbering in the mines at Worsley were coals of undefined, if not unlimited extent. Thus business and general convenience, and public and private interests, proclaimed the Bridgewater Canal, with its aqueduct, to be a necessity of the age.

Though the works of the Duke and of Brindley are their true monuments of acknowledged merit and greatness, yet we would rejoice if to these two distinguished men there could be raised a statue uniting them in their fame, as they were associated in their labours; and if to that another statue could be added, in memory of Crompton, whose invention affords untold profit to this district, there would be a recognition in death,—of benefits conferred by men whose lives were devoted to promote the prosperity of posterity rather than their own.

Be ours the pleasure and duty to be grateful for the gifts of labour and science, and may we never deny reward and fame to humble merit.

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